

Claims

- [c1] 1.A computer implemented method of arranging a plurality of content objects within a publication layout for publishing on one or more of a plurality of output media devices, said method comprising:
- defining a set of properties associated with each of said content objects;
 - defining a set of properties associated with each of said output media devices;
 - collecting said properties for each of said content objects;
 - collecting said properties for at least one of said output media devices;
 - identifying said properties of said content objects and said output media devices that have fixed values;
 - identifying said properties of said content objects and said output media devices that have variable values;
 - defining a set of relationships between said properties of said content objects, said relationships relating selected ones of said properties of each of said content objects with selected ones of said properties of other of said content objects;
 - defining properties of said relationships between said properties of said content objects;
 - defining a set of relationships between said properties of said content objects and said properties of said output media devices;
 - translating said relationships into a series of mathematical equations, wherein said variable properties of said content objects and said output media devices become the variables of said mathematical equations;
 - solving said equations simultaneously for values for said variable properties;
 - and
 - providing said solved values of said variable properties to create a layout for said publication.
- [c2] 2.A method as recited in claim 1 wherein the number of said relationships between the variable properties is insufficient to completely specify all of said variable properties, wherein the set of said relationships is supplemented by a set of auxiliary relationships chosen to obtain an aesthetically pleasing appearance for the final layout.

[c3] 3.A method as recited in claim 1 wherein one or more of said variable properties of the content objects or of the said output media are constrained to lie within a range of values, said method applying said additional constraints as additional relationships to be maintained and solving for the resulting values.

[c4] 4.A method as recited in claim 4 wherein one or more of said variable properties of the content objects or the said output media have a preferred value, said method utilizing the maintenance of the value close in some metric to the preferred value as a auxiliary relationship.

[c5] 5.A method as recited in claim 1 wherein the number of said relationships between the variable properties is too great to uniquely specify a unique solution of all said variable properties wherein said method further comprises: approximately solving said equations specifying said relationships while minimizing some metric, such as the sum of the squares of the error in the solution.

[c6] 6.A method as recited in claim 1 wherein the number of said relationships between said variable properties is too great to uniquely specify a unique solution of all said variable properties wherein said method further comprises: approximately solving said equations specifying said relationships while minimizing some metric.

[c7] 7.A method as recited in claim 1 wherein said method includes: solving said equations by maximizing the number of said relationships solved exactly.

[c8] 8.A method as recited in claim 1 wherein said method comprises: successfully fulfilling the maximum number of constraints based on an ordering of said relationships, said ordering being chosen to obtain an aesthetically pleasing appearance for the final layout.

[c9] 9.A method as recited in claim 1 wherein the layout engine reaches a solution by maximizing the number of said relationships solved exactly.

[c10] 10.A method as recited in claim 1 wherein said method includes:

identifying those relationships that are not satisfied exactly for the purpose of communicating this information to a designer.

- [c11] 11. A method as recited in claim 1 wherein said method includes:
inferring some of said relationships between said content objects" physical positions from the placement of said content objects within a design.
- [c12] 12. The method of claim 11 wherein said relationships may be viewed through a designers" interface and verified or disposed of as desired.
- [c13] 13. A method as recited in claim 1 wherein the content objects are classified into one or more groups, each group having one or more content elements, said groups having a particular priority ordering chosen for the particular publication.
- [c14] 14. A method as recited in claim 13 wherein the number of said relationships between said variable properties is too great to specify a unique solution of all of said variable properties where in said method includes:
eliminating certain ones of said content objects and said relationship until either an exact solution exists.
- [c15] 15. A computer implemented method of arranging a plurality of content objects within a publication layout for publishing on one or more of a plurality of output media devices, said method comprising:
defining a set of properties associated with each of said content objects;
defining a set of properties associated with each of said output media devices;
collecting said properties for each of said content objects;
collecting said properties for at least one of said output media devices;
identifying said properties of said content objects and said output media devices that have fixed values;
identifying said properties of said content objects and said output media devices that have variable values;
defining a set of relationships between said properties of said content objects, said relationships relating selected ones of said properties of each of said content objects with selected ones of said properties of other of said content

objects;
defining properties of said relationships between said properties of said content objects;
defining a set of relationships between said properties of said content objects and said properties of said output media devices;
translating said relationships into a measure of the preferred aesthetics, said measure being represented as a mathematical function wherein said variable properties of said content objects and said output media devices become the variables of said mathematical function;
solving for the values of said variables by minimizing or maximizing the value of said function; and
providing said solved values of said variable properties to create a layout for said publication.

[c16]

16.A method as recited in claim 15 wherein said method includes:
inferring some of said relationships between said content objects" physical positions from the placement of said content objects within a design.

[c17]

17. The method of claim 16 wherein said relationships may be viewed through a designers" interface and verified or disposed of as desired.